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Research paper

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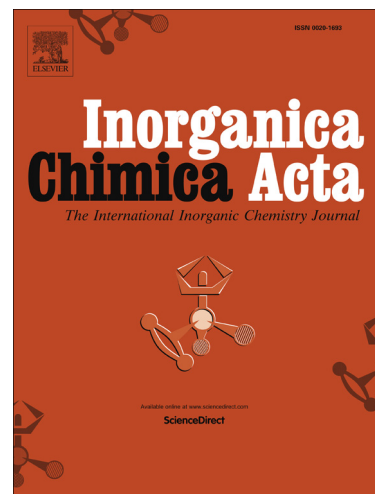
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## Direct formation of new water soluble Re and Tc complexes containing PTA (1,3,5-triaza-7-phosphaadamantane) from their permethylated salts. Reactivity and X-ray crystal structures.

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Keywords: Water-soluble complexes / Rhenium / Technetium / 1,3,5-Triaza-7-phosphaadamantane / Dithiocarbamate complexes/ X-ray structures

\* In honour of Carlo Mealli on the occasion of his 70<sup>th</sup> birthday.

### Abstract

A new *one-pot* synthetic procedure to new water-soluble rhenium and technetium complexes, directly from the corresponding permethylated species, is here presented. The new water-soluble M(IV) and M(III), (M = Re, Tc) paramagnetic complexes were obtained by treating  $[MO_4]^-$  with an excess of PTA (1,3,5-triaza-7-phosphaadamantane), in water. In the presence of  $SnCl_2$ , the complexes  $[MCl_3(PTA)_3]Cl$ , (M = Re, **1**; Tc, **3**), were obtained in good yield, while in the absence of  $SnCl_2$  the unexpected species containing methylated PTA,  $[MCl_4(PTA-Me)_2]Cl$ , (M = Re, **2**; Tc, **4**), were produced. A preliminary study of the reactivity of these products with *N,N*-diethyldithiocarbamate was also carried out: the diamagnetic binuclear  $\mu$ -oxo species  $[M_2O_3(Et_2NCS_2)_4]$  (M = Re, **6**; Tc, **7**) were isolated from the reactions of **1**, **2** and **4** with dithiocarbamate. The reaction of **3** gave rise to an unusual *epta*-coordinated technetium(III) complex  $[Tc(Et_2NCS_2)_3(PTA)]$  (**5**). The X-ray crystal structures of the new PTA complexes **2**, **4**, **5** and **7** have been determined.

### 1. Introduction

Rhenium and Technetium complexes continue to attract scientific interest for therapeutic and diagnostic applications. In this regard, the development of *one-pot* synthetic procedures for obtaining new complexes or intermediates under mild conditions is a relevant issue for applications in nuclear medicine as imaging agents ( $^{99m}Tc$ ) or therapeutic purposes ( $^{186}Re$ ,  $^{188}Re$ ) [1-7]. The rich coordination chemistry of Tc and Re, owing to their variety of oxidation

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